July 19, 1949. V. P. BOURNE-VANNECK 2,476,694

HYDRAULIC TIPPING MECHANISM FOR VEHICLES

Filed Dec. 8, 1944 2 Sheets-Sheet 1

FIG. 1.

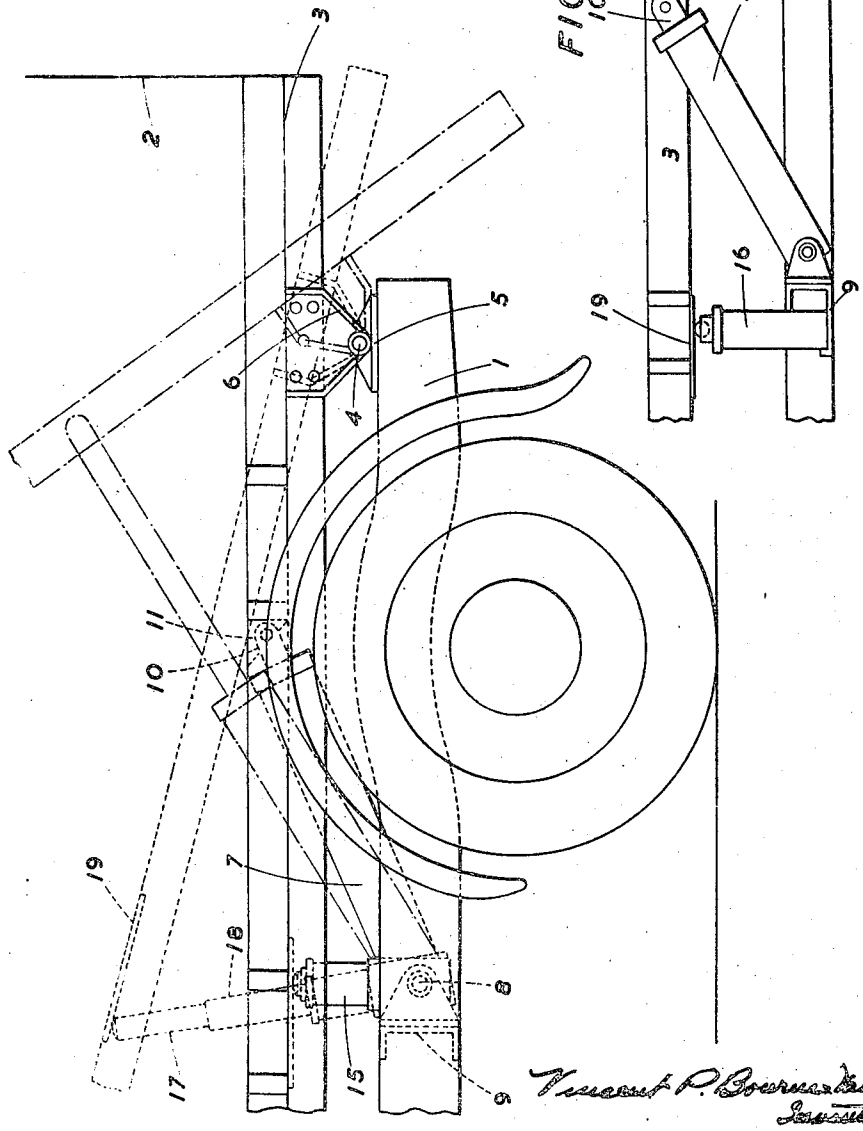


FIG. 3.

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Filed Dec. 8, 1944 2 Sheets-Sheet 2

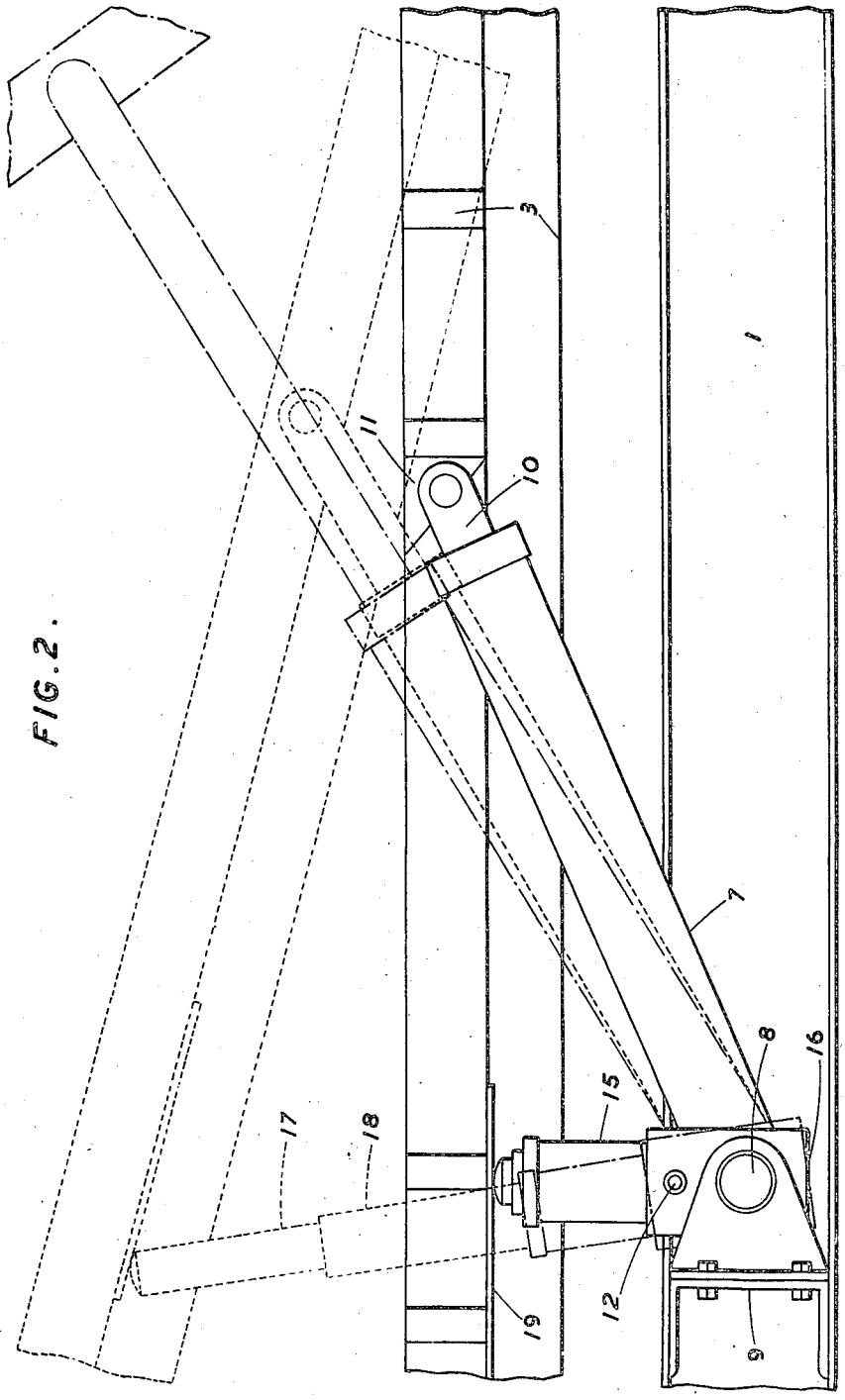


FIG. 2.

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Patented July 19, 1949

2,476,694

UNITED STATES PATENT OFFICE

2,476,694

HYDRAULIC TIPPING MECHANISM FOR VEHICLES

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Application December 8, 1944, Serial No. 567,194
In Great Britain April 14, 1943

Section 1, Public Law 690, August 8, 1946
Patent expires April 14, 1963

3 Claims. (Cl. 298—22)

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This invention relates to hydraulic tipping mechanism for vehicles with more especial reference to slant-type hoists wherein the body is raised and lowered about pivots at the rear end of the vehicle chassis by an hydraulic ram assembly trunnioned on a cross member of the vehicle and arranged at an angle between the chassis and the body of the vehicle.

Slant-type hoists of this character are advantageous in that they need little vertical space for their accommodation and so permit of a relatively low loading platform, but in use they suffer from the disadvantage that considerable rearward thrust is imposed on the rear body pivots by the hydraulic mechanism, particularly during initial movement of the body for tipping owing to the obtuse angle of the ram under these conditions, so that not infrequently crystallisation of the bearing brackets and premature failure ensues.

The present invention has for its object to remove this disadvantage and provide an improved slant-type hydraulic tipping mechanism with which the stresses are more uniformly distributed, and the rear brackets and pivots are relieved of strain during the initial movement.

Hydraulic tipping mechanism for vehicles according to the present invention essentially includes, in addition to a slant-type ram assembly between the vehicle chassis and the body frame, a supplementary ram having its axis approximately vertical and abutting the end of the body frame remote from the pivot for the initial lifting thereof without being attached thereto, said supplementary ram being incorporated in the hydraulic system in such manner as directly to lift the front part of the body during the initial tipping movement thereby relieving the rear body pivots of the considerable stress to which they are normally subject.

The mounting of the slant-type ram assembly is correspondingly relieved of stress owing to the initial lifting of the fore end of the body by the supplementary ram and, as will be understood, the ram assembly and its mounting may thus be of reduced overall gauge and weight with consequent lowering of its cost of manufacture.

Alternatively, a main ram of shorter stroke can be used with its body anchorage in closer proximity to the body pivot giving a higher velocity ratio owing to the fact that the supplementary ram affords the requisite mechanical advantage during the initial lifting of the body.

The supplementary ram assembly advantageously comprises a cylinder and ram, preferably telescopic, trunnioned with, but having its axis approximately at right angles to, the main slant-type ram, the telescopic ram of the supplementary cylinder terminating at its upper end in an abutment adapted to bear under a thrust-

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plate provided for the purpose on the underside of the body near the front thereof, the two cylinders being coupled in parallel in the hydraulic system in such manner that—when set for tipping—the hydraulic medium under pressure first passes into the supplementary cylinder causing an upward movement of its ram which directly lifts the front end of the body about its rear pivots. Subsequently after the limit of movement of the supplementary ram has been reached, the hydraulic medium is forced into the main cylinder and thence-forward operates the slant-type ram in the conventional manner until the full tipping angle, say 55° has been attained.

During lowering the procedure is reversed, the movement of the body being controlled by the slant-type ram until it reaches the position, at say 15° from the horizontal, at which the aforementioned thrust plate bears on the abutment of the supplementary ram whereafter further downward movement of the body to the normal horizontal position is regulated by the supplementary ram assembly.

The invention will be further described with reference to the accompanying drawings which illustrate by way of example two embodiments thereof and in which:

Figs. 1 and 2 show a preferred embodiment where the supplementary ram is combined with the main slant-type ram assembly as a single rocking unit.

Fig. 1 being a side elevation of the rear portion of a tipping vehicle equipped with the improved mechanism, and

Fig. 2 is a detail view to a larger scale while

Fig. 3 is a diagrammatic representation of an alternative arrangement where the supplementary ram cylinder is mounted on the vehicle chassis separately from the main slant-type ram.

Referring now to the drawings, but first more particularly to Figs. 1 and 2, the vehicle chassis is designated 1 and the vehicle body 2, 3 being the body frame and 4 one of the body pivots carried by a bracket 5 mounted on the rear end of the main longitudinal member of the chassis 1. 6 is the body rear bracket depending from the body frame 3 and riding about the body pivot 4 during the tipping movement, while 7 represents a slant-type ram cylinder fulcrumed at 8 on a main cross member 9 of the vehicle chassis on the one hand, and having a ram head 10 engaging a thrust block 11 on the body frame 3 in front of the body pivot 4 on the other.

As will be understood, when fluid under pressure is admitted to the lower end of the ram cylinder 7 from the hydraulic system (not shown) which may be of any usual form through a connection such as 12, the ram is forced outwardly and the ram head 10 causes the body to be tipped about the rear pivot 4 as represented

by the dot and dash showing in Fig. 1, the maximum tipping angle usually being of the order of 55°.

To obviate the disadvantage present with the slant-type hoists where considerable rearward thrust is imposed on the body pivots 4, particularly during initial movement of the body 2 for tipping, owing to the obtuse angle of the ram under these conditions, the present invention provides a supplementary ram cylinder 15 which has its axis approximately vertical and is incorporated in the hydraulic system in such manner as directly to lift the front part of the body during the initial tipping movement.

In this embodiment the supplementary ram cylinder 15 is combined as a unit with the main ram cylinder 7, a common casting 16 mounting both the main ram cylinder 7 and the supplementary ram cylinder 15 at an angle of circa 70° to each other so that they rock in unison about the fulcrum 8 which takes the form of journals projecting at each side of the casting 16.

With the body frame 3 in the position which it occupies when the body 2 is lowered to its normal horizontal position as shown by the full lines, the axis of the supplementary ram 15 is vertical and on the tipping valve being opened to admit fluid under pressure to the casting 16 through the connection 12, the supplementary ram—which is shown as of two part telescopic construction and is designated 17 and 18—bears under a thrust plate 19 provided for the purpose on the underside of the body frame 3 near the front of the body and directly lifts the front end of the body about its rear pivot 4.

At the limit of movement of the supplementary ram 15, 17 and 18, corresponding in the embodiment illustrated to an inclination of 15°, the main ram continues the tipping movement of the vehicle body and at this phase the main ram assembly is in a position for the ram head 10 to exert considerable turning moment about the body rear pivot 4 to swing the body to its maximum tipping position.

During lowering the procedure is reversed, the movement of the body 2 being controlled by the slant-type ram until it reaches the position at 15° from the horizontal when the thrust plate 19 near the front end of the body bears on the head of the supplementary ram 17, 18 whereafter further downward movement of the body to the normal position is regulated by the supplementary ram.

In this preferred embodiment where the main and supplementary ram assemblies rock as a unit about the fulcrum 8, upward displacement of the axis of the main ram causes the assembly to swing in a counter-clockwise direction about the fulcrum 8 with the consequence that the axis of the supplementary ram is inclined forwardly during the tipping and it is necessary to afford sufficient clear space to accommodate this forward oscillatory movement.

Alternatively however as shown in Fig. 3, the supplementary ram cylinder 15 may be a fixture carried by the vehicle cross member 9 in which case its axis remains vertical throughout its operative stroke.

The cylinders of the main slant-type ram and the auxiliary or supplementary ram may be connected in parallel in the hydraulic system so that on the control valve of the system being set to effect tipping, the medium under pressure may flow into both cylinders but owing to the increased resistance to movement of the main ram the fluid passes first into the supplementary cylinder 15 and elevates the supplementary ram 17, 18 directly to raise the body during the initial tipping movement, while at the limit of the stroke of the supplementary ram the fluid passes into the main cylinder 7 to complete the tipping movement. If desired however, the fluid may be fed first into the cylinder 15 and at or about the upper limit of travel of the supplementary ram 17, 18, cause it to uncover a port communicating with the main cylinder 7. Further, the pump may be combined with the ram assembly as a unit rocking about the fulcrum 8 thereby reducing or even eliminating separate piping for the hydraulic medium.

Where desired also, means may be associated with the supplementary ram abutment on the thrust plate 19 to lock the body in its horizontal position for loading and transport and such means may be released automatically on the control lever of the gear being set to the tipping position thus to actuate the supplementary cylinder.

By the present invention an improved economical and efficient hydraulic tipping gear for vehicles is obtained.

What I claim is:

1. Tipping mechanism for a vehicle having a body frame pivotally mounted in the vehicle chassis, a slant-type ram assembly between the vehicle chassis and the pivoted body frame, and a hydraulic system for operating said ram assembly to raise and lower the body, including a supplementary ram disposed further from the body pivot than the slant-type ram and arranged with its axis approximately vertical and with its upper end abutting the body frame for the initial lifting thereof without being attached thereto, said supplementary ram being incorporated in the hydraulic system in such manner as directly to lift the body to effect the initial tipping movement, and the continued lifting movement of the body being effected by the slant-type ram without further extension or following movement of the supplementary ram.

2. Tipping mechanism for vehicles according to claim 1 wherein the supplementary ram assembly comprises a telescopic ram terminating at its upper end in an abutment adapted to bear under a thrust-plate provided for the purpose on the underside of the body near the front thereof, the two ram cylinders being coupled in the hydraulic system in such manner that—when set for tipping—the hydraulic medium under pressure first passes into the supplementary cylinder causing an upward movement of its ram which directly lifts the front end of the body about its rear pivots.

3. Tipping mechanism for vehicles according to claim 1 wherein the supplementary ram assembly is trunnioned as a unit with the main ram assembly and rocks therewith during tipping.

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